

CLAIMS

1. A plasma display panel in which a first substrate having a protective layer formed thereon opposes a second substrate across a discharge space, with the substrates being sealed
5 around a perimeter thereof, wherein

at a surface of the protective layer, a first material and a second material of different electron emission properties are exposed to the discharge space, with at least one of the first material and the second material being in
10 a dispersed state.

2. The plasma display panel of claim 1, wherein
the first and second materials are respectively first and second crystals, and

15 the second crystal is dispersed throughout the first crystal at the surface of the protective layer.

3. The plasma display panel of claim 2, wherein the second crystal is of higher purity than the first crystal.

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4. The plasma display panel of claim 2, wherein
the protective layer is formed mainly from MgO, and
the second crystal is formed from fine MgO crystalline particles.

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5. The plasma display panel of claim 4, wherein the first crystal is obtained by baking an MgO precursor.

6. The plasma display panel of claim 4, wherein the second

crystal is oxygen rich MgO.

7. The plasma display panel of claim 2, wherein in the protective layer, at least the second crystal is doped with

5 one or more members selected from the group consisting of Si, H, and Cr.

8. The plasma display panel of claim 1, wherein at least a surface portion of the protective layer facing into the

10 discharge space includes MgO as the first material and at least one of fullerene and carbon nanotube as the second material.

9. The plasma display panel of claim 1, wherein at least a

15 surface portion of the protective layer facing into the discharge space includes at least one of an isolated metal material, an insulating material having a higher Fermi energy than MgO, and a semiconductor material having a higher Fermi energy than MgO as the second material.

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10. The plasma display panel of claim 9, wherein the isolated metal material has a work function less than or equal to 5 eV.

25 11. The plasma display panel of claim 9, wherein the isolated metal material is a member selected from the group consisting of Fe, Al, Mg, Ta, Mo, W, and Ni.

12. The plasma display panel of claim 9, wherein

plural pairs of display electrodes are disposed between the protective layer and the first substrate, and

the isolated metal material is positioned so as to overlap the pairs of electrodes in a thickness direction of the protective layer.

13. The plasma display panel of claim 1, wherein at least a surface portion of the protective layer facing into the discharge space includes MgO as the first material, and at least one of a metal material, an insulating material having a higher Fermi energy than MgO and a semiconductor material having a higher Fermi energy than MgO as the second material.

14. The plasma display panel of claim 13, wherein the second material is present at a grain boundary of the MgO included as the first material.

15. The plasma display panel of claim 13, wherein the metal material has a work function less than or equal to 5 eV.

16. The plasma display panel of claim 13, wherein the metal material is a member selected from the group consisting of Fe, Al, Mg, Ta, Mo, W, and Ni.

17. The plasma display panel of claim 13, wherein the protective layer is formed from a nanocomposite material throughout which is dispersed the first material that includes MgO, and the second material that includes at least one of the metal material, the insulating material having

a higher Fermi energy than MgO and the semiconductor material having a higher Fermi energy than MgO.

18. The plasma display panel of claim 13, wherein

5 the plasma display device has a plurality of discharge cells that divide the discharge space, and
the second material is locally present in each discharge cell.

10 19. A protective film for a plasma display panel formed in relation to a substrate surface that opposes a discharge space, wherein

at least a surface portion of the protective layer facing into the discharge space includes a first crystal and a second
15 crystal of different electron emission properties, the second crystal being dispersed throughout the first crystal.

20 20. A protective film for a plasma display panel formed in relation to a substrate surface that opposes a discharge space, wherein

at least a surface portion of the protective layer facing into the discharge space includes MgO and at least one of fullerene and carbon nanotube dispersed throughout the MgO.

25 21. A discharge light-emitting diode comprising a discharge space having a discharge gas enclosed therein and a protective layer facing into the discharge space, and for emitting light by generating a plasma in the discharge space, wherein

at least a surface portion of the protective layer facing into the discharge space includes a first crystal and a second crystal of different electron emission properties, the second crystal being dispersed throughout the first crystal.

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22. A discharge light-emitting diode comprising a discharge space having a discharge gas enclosed therein and a protective layer facing into the discharge space, and for emitting light by generating a plasma in the discharge space,

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at least a surface portion of the protective layer facing into the discharge space includes MgO and at least one of fullerene and carbon nanotube dispersed throughout the MgO.

15 23. A PDP manufacturing method comprising the steps of forming a protective layer on a first substrate and sealing the first substrate and a second substrate together via a discharge space with the protective layer facing into the discharge space, wherein

20 the layer-forming step includes the substeps of mixing a second crystalline material in a first crystalline material, applying the mixture to a surface of the first substrate, and baking the applied mixture.

25 24. The manufacturing method of claim 23, wherein an MgO precursor is used as the first crystalline material, and fine MgO crystalline particles are used as the second crystalline material.

25. The manufacturing method of claim 24, wherein in the layer-forming step, at least the second crystalline material out of the first and second crystalline materials is doped with a member selected from the group consisting of Si, H,
5 and Cr.

26. The manufacturing method of claim 25, wherein in the layer-forming step, one of annealing and plasma doping is selected as a technique of doping at least the second
10 crystalline material with H.

27. The manufacturing method of claim 25, wherein in the layer-forming step, plasma doping using SiH_4 or Si_2H_6 is performed as a technique of doping at least the second
15 crystalline material with Si.

28. A PDP manufacturing method comprising the steps of forming a protective layer on a first substrate and sealing the first substrate and a second substrate together via a
20 discharge space with the protective layer facing into the discharge space, wherein

the layer-forming step includes the substeps of mixing at least one of fullerene and carbon nanotube in an MgO precursor, applying the mixture to a surface of the first
25 substrate, and baking the applied mixture.